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Socio-Economic Status and Activities of Neighboring Communities in Pandam Wildlife Park, Plateau State, Nigeria

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ABSTRACT
Pandam Wildlife Park is an important wildlife conservation area in Nigeria. This study assessed the socio-economic status and activities of neighboring communities in the park using structured questionnaires. The dominant monthly income level per family was <N20,000. Dependence on forest resources was observed. Among the top reasons for accessing the park were; herb collection, firewood collection, wood for construction, and hunting. Most respondents described the park's security structure as "relaxed". Therefore, security measures were in place but inadequate or porous. Results showed that the villagers had no prior knowledge of the afforestation program. The neighboring community cannot survive without depending on the park. All respondents believed that the park could only be protected sustainably when the locals are provided with alternative sources of income and resources. Other possible ways pointed out were: recruiting more rangers, tight security, zero corruption, and punishment. None of the respondents believed that sensitization or migration of community members from the area could solve the problem. In conclusion, the park needs intervention among stakeholders. This study has provided useful information on measures to be taken for the protection of Pandam Wildlife Park and the conservation of its biodiversity.

KEYWORDS: forest; security; settlements; socioeconomics; wildlife park

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1. Introduction

Human settlements are habitats for the human population. Hence, they are recognized as ecosystems. The deleterious impacts of man on the natural environment have been widely reported. This has led to the disruption of basic functions and services provided by the ecosystem, hence termed ecosystem degradation [1, 2]. For example, habitat loss, fragmentation, and destruction are directly linked to the over-exploitation of forest resources leading to the loss of forest biodiversity [3, 4]. These activities are aggravated as a result of poor forest law and regulations and weak economic policies,

especially in African countries [5]. In this region, there is over-dependence on forest products as a result of over-population. Protected areas are often encroached upon by neighboring communities for settlement, farming, hunting, logging, firewood collection, and other activities [1, 2, 6].

Nigerian forest regions are under pressure from various anthropogenic activities and developmental projects [5]. The current advocacy is anchored on the protection of forest resources and sustainable utilization within the ambience of social forestry, which defines a cordial relationship between the local settlers and forest management [7].

Pandam Wildlife Park is popular in Nigeria, and it is one of the oldest protected areas in African rainforests, notable for its biodiversity [8, 9]. It was established in 1972 in Plateau State, Nigeria. It is home to many animals and plants that are rarely found in other parts of the country. It is a center of tourist attraction but now gradually losing its intended purpose of creation. The original aim was to enable tourists to appreciate the natural endowment present in Nigeria and conserve the bioresources present for posterity. There are many species of reptiles and mammals. The latter include elephants, baboons, antelopes, and other games. Species of birds are copious, while the rivers are rich in fish species. Diverse economic trees are present to support the wildlife in maintaining a balanced ecosystem. At present, the park is fast losing its core values due to anthropogenic activities in and around the park [8, 9].

Human settlements around the park have also been linked to over-exploitation of the forest resources due to over-dependence on forest products for economic gains and survival. Human activities, especially wood extraction, agricultural activities, hunting, and burning, have created an unabated pressure on the forest. Reports have also identified poor management of the park as a major problem [8, 10]. The present study aimed at investigating the impacts of the neighboring communities surrounding Pandam Wildlife Park. It sought to determine the causes of encroachment by collating information on the socio-economic status and needs of the people, the security architecture of the park, and possible ways to strike a balance between conservation of resources and human settlements.

2. Methodology

2.1 Study Area

Pandam Wildlife Park (PWP), established in 1972, is located in Qu'apam LGA, Plateau state, Northern Guinea Savanna of Nigeria, with a landmass of 327.54 km^2. The coordinates are as follows: latitudes 8^o 351 N and 8^{o}551 N; and longitudes 8^o 001 E and 10^o 001 E. The neighboring towns are given as follows: Namu (East); West (East); Dep River (North); Aningo, Pandam, and Nasukuuk (South) (Figure 1). It is positioned within North of the Benue River and South of Plateau State. The three habitat types found in the park (natural forests, riparian forest, and savanna woodland) are homes to many species of plants and animals [8, 11].

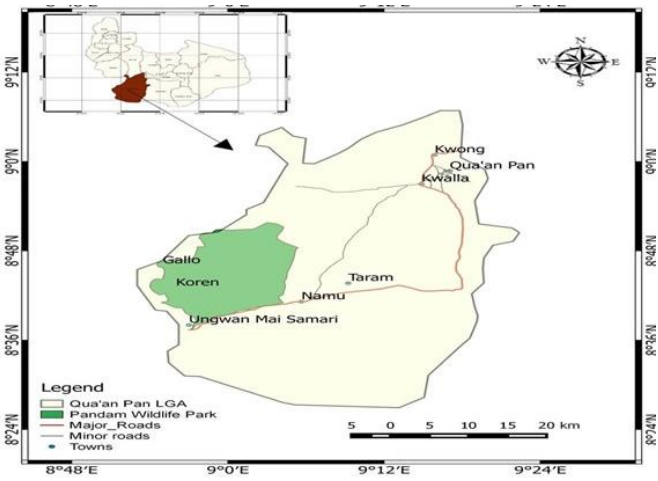

Figure 1. Qua'an Pan L.G.A showing Pandam game reserve
Source [8, 11].

2.2 Structured Questionnaires

The method applied by Andrew-Essein et al. [6] was used. It was a survey method with open-ended questions. Structured questionnaires were designed and administered to 30 members of two communities bordering the Park Pandam and Namu (15 questionnaires each) with due approval, ethical considerations, and consent of the respondents. The sample size was limited to those who were willing to supply the needed information from 18 years of age and above within the enclave communities. Questions fell into four major categories:

a. Socio-economic status of the respondents
b. Security architecture of the park
c. Impacts of the community members on the forest
d. Knowledge of afforestation and advocacy

The socio-economic status of respondents investigated seven basic parameters, including the level of education, age, income, family size, mode of cooking, health care type, and type of housing. On the security architecture of the park, inquiries were made into the following: access to the park, purpose, zones permitted to enter, the robustness of security, relationship between the locals and forest guards, and frequency of visits to the park. Modes of communication were English and Hausa Languages.

2.3 Park Visibility Study

Physical evidences of human activities were observed, and pictures were taken using a digital camera. This exercise was carried out under due permission and in conjunction with the forest guards. Both the peripheral and core zones were assessed.

2.4 Data Analysis

Data were computed and analyzed on the Microsoft Excel Workbook for grouping, frequency, percentages, and graphical presentation.

3. Results

Tables 1-5 provide vital information sourced from questionnaires administered to thirty respondents living around Pandam Wildlife Park. Socio-economic data (Table 1) revealed that 93% of the respondents had primary and secondary education as the highest levels attained, while only 7% had tertiary education. The elderly (>31 years old) constituted 67% of the respondents. The dominant monthly income level (50%) was within N10,000-N20,000 made from agricultural activities, while the dominant family size (63%) comprised 6-10 persons. Thus, the income level of the people around the park was low, while the family size was large. All of the respondents used firewood, charcoal, and plant-based fuel sources for cooking (Figure 2), while 83% depend entirely on herbs for health care (Figure 3). About 93% of the people use burnt bricks, thatched roofs, bamboo, and palms for house construction. All indicators pointed to the close dependence of the people on forest resources for survival.

Table 2 provides information on the security status of Pandam Wildlife Park. People were permitted entry into the park under due permission (47%) or during a regulated time (20%), while 7% believed they could gain access without permission. About 27% of the respondents said entry to the forest is strictly denied to the locals. Therefore, security measures were in place but inadequate or porous. There were different reasons given why the locals chose to enter the park. Herb collection was given a 100% vote, followed by firewood collection (97%), wood for construction (50%), hunting (47%), and farming (33%). Tourism (7%) and worshipping of ancestral deities (3%) were ranked lowest (Figure 4). About 73% of the respondents stated that people had access to only the peripheral zone, while 27% said that both the peripheral and core zones could be accessed. According to 63% of the respondents, the security structure of the park was described as relaxed, while 37% described it as tight. The forest rangers were believed to be friendly (83%) as most respondents had family members or friends as part of the rangers (63%). About 60% of the respondents visited the park at least once a week.

Results showed that the villagers had no prior knowledge of the afforestation program (83%) as all respondents were not aware that trees could be replaced after cutting (Table 3). Respondents believed that wood businessmen were responsible for cutting down trees (73%), and the government usually permitted them (93%). None of the respondents confessed to having cut down trees in the park apart from firewood collection when trees are cut down or from tree branches in standing trees when permitted to do so (50%). However, deforestation and habitat destruction were evident within the park (Figure 6). Information on advocacy and sensitization programs among

Table 1. Socio-economic status of the respondents living around Pandam Wildlife Park.

Type of information	Parameters	Response type	Frequency and proportion (%)
Socioeconomics	Highest level of education	Primary	10 (33.3%)
		Secondary	18 (60.0%)
		Tertiary	2 (6.7%)
	Age	18-30 years	10 (33.3%)
		31-50 years	14 (46.7%)
		>50 years	6 (20.0%)
	Monthly Income level	<N10,000	8 (26.7%)
		N10,000-N20,000	15 (50.0%)
		N21-N50000	7 (23.3%)
		>N50,000	0 (0.0%)
	Family size	<5 persons	3 (10.0%)
		6-10 persons	19 (63.3%)
		>10 persons	8 (26.7%)
	Mode of cooking	Firewood	30 (100%)
		Charcoal/plant sources	30 (100%)
		Kerosene	1 (3.3%)
		Gas	0 (0.0%)
	Health care type	Herbs	25 (83.3%)
		Orthodox	18 (60.0%)
		Combined	30 (100%)
	Type of housing	Burnt bricks/thatched	19 (63.3%)
		Bamboo/thatched	18 (60.0%)
		Cement blocks/galvanized	3 (10.0%)

Table 2. Information on the security status of Pandam Wildlife Park.

Type of information	Parameters	Response type	Frequency and proportion (%)
Access to the park	Are you allowed entry into the park?	Yes, without permission	2 (6.67%)
		Yes, with permission	14 (46.7%)
		No	8 (26.7%)
		Yes, during certain hours	6 (20.0%)
	Purpose of accessing the park	Firewood	29 (96.7%)
		Herbs	30 (100%)
		Farming	10 (33.3%)
		Hunting	14 (46.7%)
		Wood for construction	15 (50.0%)
		Tourism/relaxation	2 (6.7%)
		Worshipping deities	1(3.3%)
	What zone are you allowed to access?	Peripheral alone	22 (73.3%)
		Peripheral and Core	8 (26.7%)
	Is security level tight or porous?	Tight	11 (36.7%)
		Relaxed	19 (63.3%)
	Are the security guards friendly or unfriendly?	Friendly	25 (83.3%)
		Unfriendly	5 (16.7%)
	Do you have family members or friends as part of the rangers?	Yes	19 (63.3%)
		No	11 (36.7%)
	How often do you visit the park?	Everyday	4 (13.3%)
		At least once a week	18 (60.0%)
		At least once a month	5(16.7%)
		Occasionally	3 (10.0%)

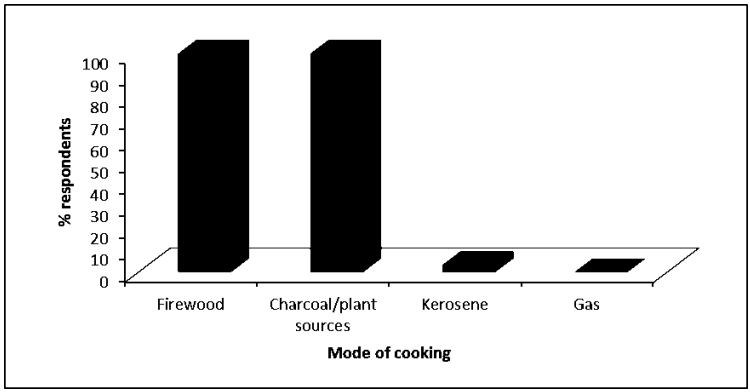

Figure 2. Mode of cooking among people living around Pandam Wildlife Park.

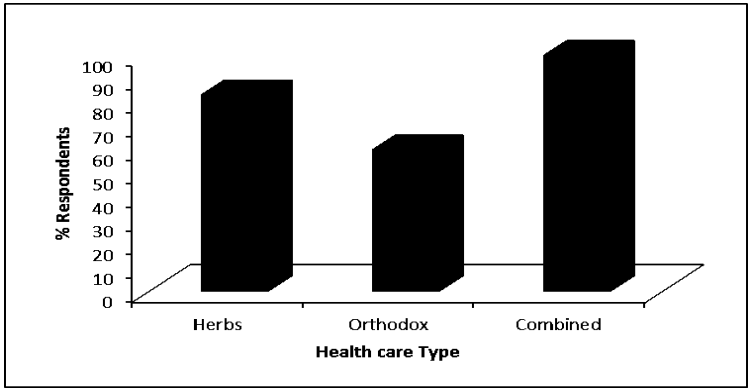

Figure 3. Healthcare type among people living around Pandam Wildlife Park.

respondents (Table 4) revealed that the neighboring community could not survive without depending on the park (70%). Impacts of members of the community on the park were rated as positive (37%), negative (40%), or both (23%). The information showed that the park could only be protected sustainably when the locals are provided alternative sources of income and resources (100%), as shown in Figure 5. Other possible ways included: recruiting more rangers (50%), tight security (33%), zero corruption (20%), and punishment (13%). None of the respondents believed in sensitization or migration of community members from the area. Meanwhile, community members were not sensitized to the impacts of human activities on the park (73%). All eight respondents believed that the park management usually did

Table 3. Knowledge of afforestation program among respondents living around Pandam Wildlife Park.

Type of information	Parameters	Response type	Frequency and proportion (%)
Afforestation	Knowledge about deforestation?	Yes	5 (16.7%)
		No	25 (83.3%)
	Who are those that do cut down trees?	Villagers	8(26.7%)
		Wood businessmen	22 (73.3%)
	Are deforesters permitted by the government to do so?	Yes	28 (93.3%)
		No	2 (6.7%)
	Are you aware of tree replacement after cutting?	Yes	0 (0%)
		No	30 (100%)
	Have you or any of your family members cut down trees in that area before?	Yes	0 (0%)
		No	30 (100%)
	When others cut down trees, do you go there to gather firewood?	Yes, under permission	15 (50%)
		No	15 (50%)

Table 4. Information on the advocacy program of Pandam Wildlife Park protection among respondents.

Type of information	Parameters	Response type	Frequency and proportion (%)
Advocacy/ Sensitization	Do you think the neighboring community can do without depending on the park?	Dependent	21 (70%)
		Independent	9 (30%)
	Do you think that members of the neighboring communities are affecting the park positively or negatively?	Positively	11 (36.7%)
		Negatively	12 (40%)
		Both	7 (23.3%)
	In what way do you think the park can be totally protected? (responses)	Tight security	10 (33.3%)
		Recruiting more rangers	15 (50.0%)
		Sensitization	0 (0.0%)
		Punishment/enforcement	4 (13.3%)
		Zero corruption	6 (20.0%)
		Providing alternatives to the locals	30 (100%)
			30 (100%)
		Job creation/income	0 (0.0%)
		Migration of locals	0 (0.0%)
	Are members of the community sensitized on their impacts on the park?	Yes	8 (26.7%)
		No	22 (73.3%)
	Who does the sensitization?	NGO	2 (25%)
		Govt officials	2 (25%)
		Park management	85 (100%)
		Community leaders	2 (25%)

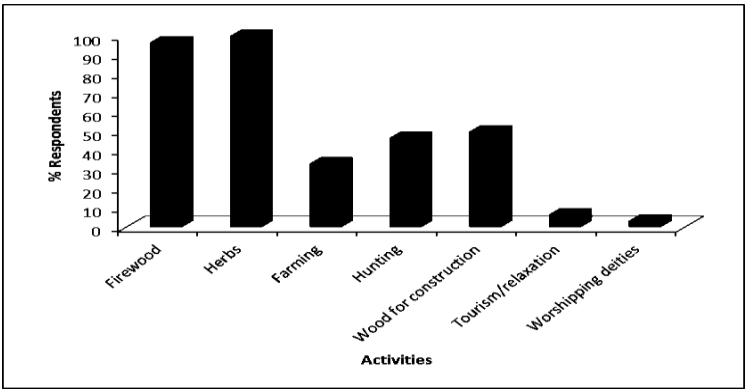

Figure 4. Purpose of accessing the park by respondents.

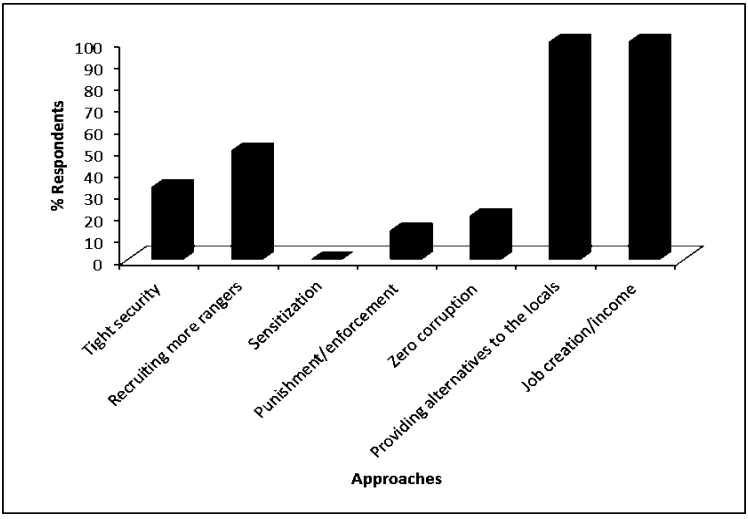

Figure 5. Sustainable approaches to protect the park.

Figure 6. Evidences of logging activities and habitat destruction.

sensitization, while two respondents linked sensitization to either non-government organizations (NGOs), government officials, or community leaders.

4. Discussion

The outcome of this study suggests the need for awareness and renewed strategies in the conservation of forest resources in the Pandam Wildlife Park as suggested in previous reports [12, 13]. Many authors have also suggested strict compliance with the Forest Conservation Act to checkmate the alarming rate of deforestation. The present study aligns with the concept of social forestry. In this context, there is a win-win situation whereby the rural dwellers sustainably benefit from forest resources while the forest resources are maintained. Sustainable fishing, hunting, grazing, and the use of forest products should be encouraged. This view was earlier supported [14-16]. At the same, the local communities should be provided with alternative resources in order to reduce pressure from the forest.

Community members should be sensitized to the need to protect the forest and the resources. People should be aware of the problems and consequences associated with deforestation. Generally, a sound knowledge of the ecological values of afforestation should be advocated [5]. Based on information obtained from the locals, illegal hunting for game accounted for 27% of the highest anthropogenic activities recorded among the illegal entrants. This act exposed the park to danger, thereby making conservation efforts unfruitful. Some animals had been considered endemic to

Pandam. This act contravenes international law on biodiversity and negates the animal's right to live [11]. While moderate and authorized hunting had been suggested to regulate population sizes of certain species of animals, unsustainable and illegal hunting might affect the fragile population of endangered species at the risk of extinction. Arising from international treaties and conventions on biodiversity, the concept of sustainable development was established as enshrined in the sustainable utilization of resources [11]. This position was supported by researchers [7, 17, 18].

Unauthorized farming within the park accounted for 24% as the second-highest human activity, followed by the collection of different kinds of forest products (18%), logging (16%), and firewood collection (15%). These factors were earlier reported as the leading causes of deforestation [5]. The survival of the forest trees and their sustainable utilization in the Pandam Wildlife Park are not guaranteed, as evident in physical confirmation of habitat destruction and cutting down of trees without replacement. The above position was earlier submitted in a related work where encroachment was noted to cause forest degradation, thereby disrupting the provision of ecosystem services and also leading to biodiversity loss [2, 19].

This study found a strong bond between the locals and the forest resources. For example, firewood and charcoal are the only means of cooking, while forest trees and palm leaves are exploited for the construction of local houses. Majority of the people also use herbs collected from the forests to treat diverse diseases. This confirms earlier reports among some workers on the diverse existence of medicinal plants and their uses in Pandam Wildlife Park [20]. From all indications, there is a huge pressure exerted by man on the resources of the park. This could be attributed to the porous nature of the existing security apparatus, weak policy, and weak enforcement as established through the friendly nature of the rangers, some of whom are related in one way or the other to members of the community. Human settlement around the Pandam Wildlife Park seems to be the leading cause of habitat destruction observed.

In a related study, Onen et al. [2] attributed the loss of tree forests to the impact of human settlement around the Oban and Okwangwo forests of Cross River National Park, Nigeria. Their reports suggested the total relocation of human settlements around forest reserves to ensure maximum protection. In the survey study, the security structure of the Pandam Wildlife Park was described by respondents as relaxed. For instance, 47% of the respondents confirmed that people are permitted entry into the park under due permission. This was supported by available records obtained from the management, whereas the majority of those arrested for illegal entrance were not penalized. This information about the Pandam Wildlife Park was earlier provided in the past. Unanaonwi and Amonum [10] evaluated the status of woody plants used by three neighboring communities surrounding the Pandam Wildlife Park, namely: the Pandam, Namu, and Kayarda communities. They found that the communities had access to the park and were totally dependent on the woody plants used for different purposes. In their report, the fragility and porosity of the park are leading to the loss of tree biodiversity and loss of forest resources. Audu and Shola [8], in their survey, found a loss of diversity in avian species in both Pandam Wildlife Park and the surrounding farmland. Also, Uloko and Yager [9] reported the use of an indigenous land tenure system in the area, and this has hindered the development of the park.

It was established from the current findings that the surrounding communities enjoy the support, cooperation, and understanding of the Pandam Wildlife Park management within the purview of social forestry and social responsibility in a bid to

ensure peaceful human co-existence and avoid conflicts that could degenerate into war with the poorly motivated rangers. According to Andrew-Essein et al. [6], forest managers are advised to develop options and strategies for conflict reduction in protected areas based on the position of the people living around the Cross River National Park. Regardless of the management strategy put in place in the Pandam Wildlife Park on peaceful co-existence, cases of compromise against the forest and the protection of its resources are established. As a result, the main goal of the forest is defeated being a protected area established by law to protect and conserve the nation's biodiversity. From a broader perspective, staff motivation is very important in any workplace. Further investigation showed that the rangers and other staff are not properly motivated to work as they listed some factors that prevent them from performing optimally. Top on the lists were lack of incentives, inadequate working tools, and lack of modern forest gadgets. These factors may account for the feeble security system of the park.

5. Conclusion

Pandam Wildlife Park is faced with challenges caused by human settlements. Socio-economic information revealed a low standard of living among people living around the Pandam Wildlife Park. All indicators showed the vulnerability of the park to the influx of the locals and subsequent overexploitation of resources. The implication lies in the loss of forest resources and games that are endemic to the park, thereby undermining the purpose of bioconservation with foreseeable loss of biodiversity in the future. This study has identified the lapses of the park and has also provided useful information on adequate measures to be taken for the protection of Pandam Wildlife Park and the conservation of its biodiversity. All stakeholders should intensify efforts to sensitize members of the neighboring communities living around the Pandam Wildlife Park. While social forestry is advocated, the security network should be well coordinated to protect the park's resources. There is a need for further studies on the conservation status of economic trees and wildlife present in the park for close monitoring for conservation purposes.

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Conflict of Interest Statement

The authors declare no conflict of interest.

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